6. Biofilms and microphytobenthos: community composition, physiology, functional aspects, interactions with bacteria

6PO.1

PHOTOTROPHIC COMMUNITIES COLONISING A ROCKY SHORE IN SLIEMA, MALTA

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Phototrophic biofilms and biomats are found growing on coastal rocky shores around the Maltese islands. No detailed studies to determine the composition of these phototrophic communities have been carried out to date. This study aimed at increasing the knowledge of the genetic diversity of phototrophic biofilm- and biomat-forming organisms growing along the coastline of Sliema in Malta. Representative samples were obtained using techniques that were non-invasive to the underlying substratum. These were studied by direct observation using light and epifluorescence microscopy, as well as by molecular and phylogenetic analyses based on the sequencing of the SSU rRNA genes and the ITS. Microscopic analysis showed that the biofilms and biomats were highly diverse communities made up of both phototrophic and heterotrophic organisms. The predominant microorganisms were filamentous cyanobacteria ranging from the fine Leptolyngbyaceae, including *Nodosilinea* strains, to the non-heterocytous *Phormidium, Neolyngbya* and *Lyngbya*, as well as heterocytous *Calothrix* morphotypes. The coccal cyanobacteria included species of *Aphanocapsa* and *Chroococcus*. Other phototrophic taxa comprised the green microalgae belonging to species of *Chlamydomonas* and *Coelastrella*, diatoms of *Navicula* spp., the coccal red alga *Porphyridium*, as well as germlings of the filamentous macroalga *Cladophora*. Ciliated protozoans and microcrustaceans were also observed sharing the same microhabitat. The isolation of new microalgal strains from these phototrophic communities highlights the importance of a combined polyphasic approach to supplement current knowledge about the biodiversity of phototrophic biofilms and biomats colonizing rocky shores.

6PO.2

AUTOTROPHS IN ANTARCTIC MELTWATER MICROBIAL MATS – THE TOUGH SURVIVORS PART II

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Autotrophs inhabiting polar meltwater microbial mats are exposed to extreme environmental conditions. These extreme conditions include large fluctuations in ambient radiation (PAR and UVR), temperature, salinity and desiccation. We studied microbial mats growing in meltwater on soil close to Potter Cove, King George Island, January to February 2015, and December 2015 to January 2016. Preliminary results from the first expedition were presented at EPC6 and here we present results from both expeditions. The water depth was 0.5 to 2 cm. The dominating autotrophs were pennate diatoms and cyanobacteria. In five different experiments, the effects of ultraviolet radiation (UV A and UV B), temperature (freezing), elevated salinity and desiccation were tested in the laboratory and outdoor set ups. Measured variables differed between experiments and included photosynthetic activity (pulse amplitude modulated fluorometry, PAM), non photochemical quenching (PAM), rapid light curves (PAM), species composition (light microscopy, SEM), cell numbers of diatoms and cyanobacteria (filaments) (light microscopy), photosynthetic pigments (HPLC), lipid peroxidation (thiobarbituric acid reactive substances (TBARs) assay) and biomass of heterotrophic bacteria (DAPI, microscopy). Increasing salinity from freshwater (0) to salinity 30 did not seem to have any effect over seven days. After three weeks in ambient radiation, it was apparent that the microbial community was tolerant to both UV A and UV B radiation (reflected in, for example, total cell numbers and photosynthetic activity, F_v/F_m). The most abundant species were *Nitzschia* sp. and an unknown naviculoid in the size range 25-40 µm (length). For cyanobacteria, the most frequently